

WHAT IS CLAIMED IS

1. A by-pass valve unit for a high pressure liquid delivery unit,
the delivery unit comprising:
a motor-driven high pressure pump (11) having a delivery side (13) and a
5 suction side (14), and
a delivery gun (15) connected to the pump delivery side (13) by a delivery
conduit (16) and having a flow on-off valve, a source of liquid being
connected to the pump suction side (14),
the valve unit comprising a by-pass valve (25, 33) arranged to close or
10 alternatively, when in the open state, to enable direct flow passage
between the delivery side (13) and the suction side (14), and having a
control means (31, 32) sensitive to the liquid pressure in the delivery
conduit (16),
characterized in that said control means comprises two valving elements
15 (31, 32) which are normally joined together to form one piece in contact
with the liquid of the delivery conduit (16), but which separate when the
pressure in the delivery conduit (16) exceeds the normal delivery value
(P_1) following flow interruption by the delivery gun (15), to hence provide
direct passage for the liquid from the delivery conduit (16) to the suction
20 side (14).
2. A valve unit as claimed in claim 1, characterized by comprising:
an upper chamber (21) connected to the delivery conduit (16),
a lower chamber (22) connected to the pump delivery side (13) and having
a lower liquid passage orifice (25) connected to the suction side (14) to
25 enable said direct flow passage between the delivery side (13) and the
suction side (14), and

a third orifice (33) arranged to close or open the lower passage orifice (25),

the first (31) of said two valving elements (31, 32) of the control means being positioned to separate the two chambers (21 and 22) and presenting
5 an upper orifice (26) for direct liquid passage from the delivery conduit (16) to the suction side (14),

the second (32) of said two valving elements (31, 32) being normally positioned to close the upper passage orifice (26), and opening this latter when the pressure in the delivery conduit (16) exceeds the normal delivery
10 pressure (P1) following flow interruption by the delivery gun (15).

3. A valve unit as claimed in claim 2, characterized in that said second valving element (32) opens the upper passage orifice following its downward movement together with the first valving element (31) and its subsequent stoppage in its end-of-travel position, while the first valving
15 element (31) continues its downward travel.

4. A valve unit as claimed in claim 2, characterized in that the first valving element (31) is subjected to the action of an elastic means (34) arranged to urge it upwards, and is constrained to the second valving element (32) by a bearing constraint which acts only when the first valving
20 element (31) is thrust upwards against the second valving element (32) and vice versa the second valving element (32) is thrust downwards against the first valving element (31).

5. A valve unit as claimed in claim 2, characterized in that the second valving element (32) is rigidly joined to the third valving element (33),
25 which opens the lower orifice (25) following its downward movement as a result of an equal movement of the second valving element (32).

6. A valve unit as claimed in claim 5, characterized in that the upward movement of the second valving element (32) is limited by the engagement of the third valving element (33) with the closure seat of the lower orifice (25).

5 7. A valve unit as claimed in claim 5, characterized in that the second valving element (32) is joined to the upper end of an axial rod (32a) which passes through the upper orifice (26) and axially traverses the entire lower chamber (22) and passes through the lower orifice (25), to emerge from the chamber (22); the third valving element (33) being fixed to that portion
10 of the rod (32a) external to the chamber (22).

8. A valve unit as claimed in claim 5, characterized by comprising an axial push rod (43) which projects from the top downwards into the upper chamber (21) until it abuts against the upper end of the second valving element (32), the axial position of the push rod (43) being adjustable to
15 downwardly move the second valving element (32) and with it the lower valving element (33), to open the lower orifice (25) to a gauged extent.

9. A valve unit as claimed in claim 5, characterized by comprising a stem (41) which is directly operated by the lower valving element (33) and has one end positioned external to the body (20) of the valve unit to
20 mechanically operate a control means (42) for halting the motor (12), when the second valving element (32) is brought into its lower position.